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ABSTRACT

These six booklets in the "Give Earth a Chance Series" are titled, "Dirty Air," "Trash is Taking Over," "Sounds and Silence," "Pesticides are Perilous," "Tragedy in the Laundromat," and "Troublesome Tail Pipes." The booklets are suitable for elementary use, and are intended to stimulate discussion and activities related to various forms of pollution. Each booklet begins with a story in which the main characters encounter a pollution problem; an investigation or study to evaluate a problem in the community follows. The stories involve the characters in actual field work, collecting and analyzing data in such studies as air pollution measurement, detergent studies, trash measurement, etc. The stories serve as a model for actual class activities, and many questions and problems are left unexplored, but are presented to stimulate further investigation. Many suggestions are made for student activities. This work was prepared under an ESEA Title III contract. (PR)

ED047939

PESTICIDES ARE PERILOUS

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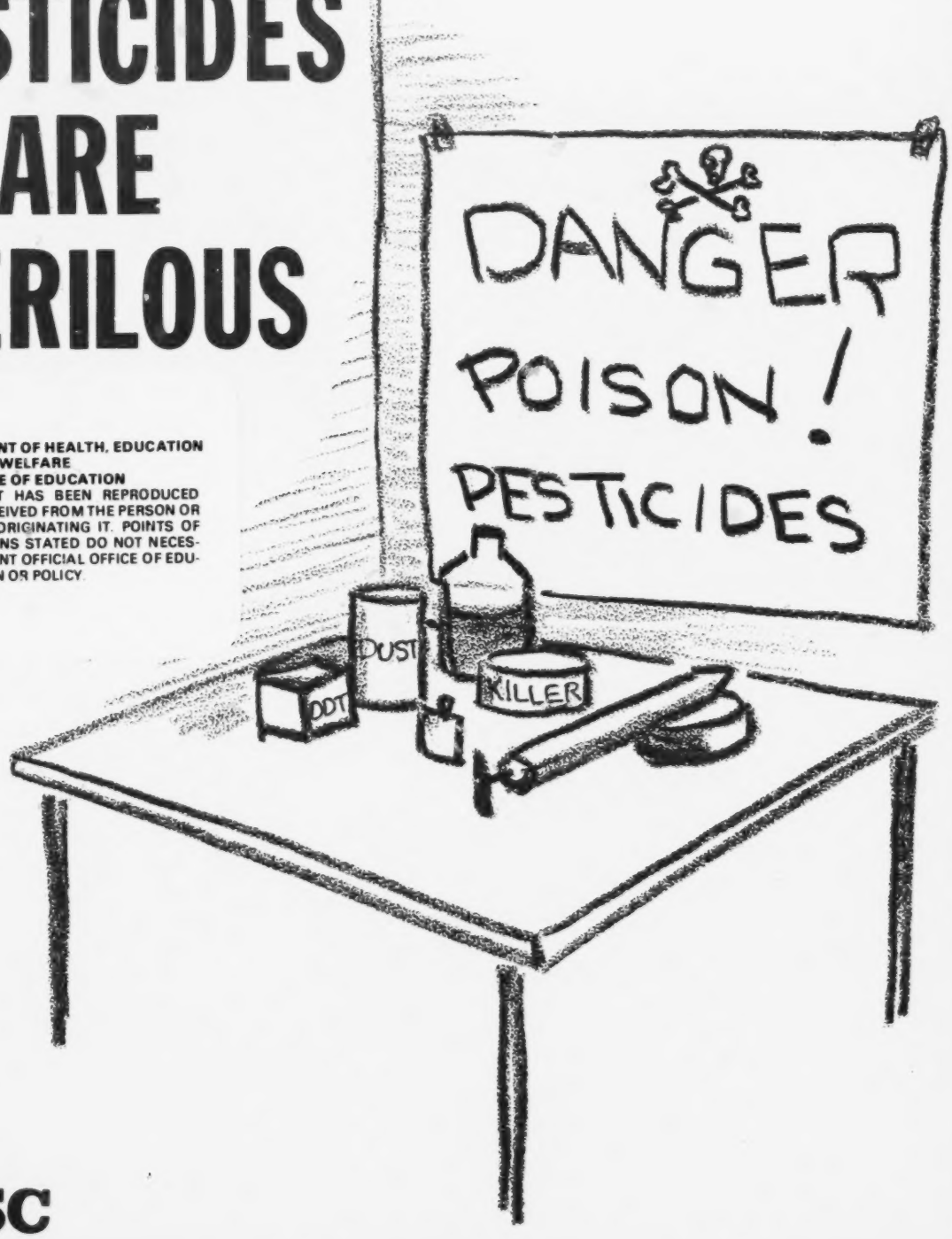

SE 009 811

ESC

ARE PERILOUS

PESTICIDES

IN GIVE EARTH A CHANCE SERIES

DIRTY AIR

TRASH IS TAKING OVER

SOUNDS AND SILENCE

PESTICIDES ARE PERILOUS

TRAGEDY IN THE LAUNDROMAT

TROUBLESOME TAIL PIPES

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"GIVE EARTH A CHANCE"

A series of booklets produced by the

Environmental Science Center
5400 Glenwood Avenue
Golden Valley, Minnesota 55422

to promote an understanding of the environmental crisis and to form a basis for effective and constructive action by individuals.

Paul spent Christmas vacation with his grandparents who had retired and bought a home on a Pacific beach near Australia. Off shore were beautiful coral reefs full of abundant and fascinating marine life. Paul had taken his snorkel, mask, and water fins so he and his grandfather could spend time observing the life of the coral reefs. One of the first things he and his grandfather did was row the skiff out to a favorite section of reef and begin swimming lazily around watching the gorgeous panorama laid out on the ocean floor below them.

However, they hadn't been swimming for long when Paul noticed a massive,darkish smear moving slowly across the coral toward them. He called his grandfather's attention to the movement.

2

A pained expression crossed this grandfather's face as he motioned for Paul to follow him towards the curious mass. As they swam, the darkness took shape and form. Paul recognized that it was composed of thousands of individual starfish. His grandfather stopped swimming and started treading water.

"That's just what I feared, Paul; they're starfish. The starfish are destroying the coral. Once the coral is gone all the life that depends on the coral will be gone too. Besides that the beaches will be changed once they are no longer protected by the coral reefs," said his grandfather.

They swam back to the boat and headed for home--their day destroyed by the ominous starfish invasion. As they rowed back, Paul's grandfather explained that the starfish population used to be controlled by the giant triton snail who preyed on the starfish. Shell collectors and pesticides in sea water have almost destroyed the triton population. Now the starfish population has exploded.

Paul asked how the pesticides got into the sea water. His grandfather answered that they are used to control pests on land and are washed or blown great distances, eventually reaching the ocean.

Paul spent most of the rest of his vacation swimming and exploring the ocean beach. His whole vacation was somewhat dulled by the episode with the starfish though. He couldn't believe his grandfather's paradise might be destroyed because of shell collectors and pesticides.

THE TRIP HOME

Paul took the plane home and on his way read the following newspaper article:

Malaria Control? Borneo Has Had It!

LaMont C. Cole, a Cornell scientist, reports on the elimination of the malaria-carrying mosquito from Borneo.

The island was sprayed with DDT. Fine, except the DDT killed the mosquitoes but not the roaches. The roaches accumulated DDT in their bodies. Gecko lizards ate the roaches and the DDT from the roaches disturbed the nervous system of the lizards. The lizards lost much of their agility. Cats feasted on the lizards and died. The cat population down, rats moved in from the forests, bringing with them worries about a plague. So cats were parachuted into villages to snare the rats.

The cats did their job but in the meanwhile roofs of houses started caving in. For suddenly there weren't enough lizards roaming the floors and walls of huts to eat the caterpillars which feed on roof thatching.

They've got malaria under control in Borneo, but everything else it seems has gone out of whack.

Pesticides were involved in the starfish episode and now in this strange event in Borneo. It bothered Paul and when he got home he told his father the two stories. He asked his father what they should do now. His father suggested he visit the university and get more information.

The University Visit

Paul went to the school of agriculture at the University. He talked to a man who taught invertebrate biology.

Paul found out that pesticides aren't just "insect killers". Pesticides can be (1) insecticides for controlling insects and "bugs"; (2) herbicides for "weeds"; and (3) fungicides for molds, fungus and rust. Some of the dangerous pesticides are herbicides.

The question Paul asked first concerned the insecticide DDT. Paul found that DDT has been responsible for saving many thousands of lives. It has been used to control death causing diseases such as malaria. Crops have been saved and yields increased by controlling insects with DDT. Many people would have died from starvation if it hadn't been for DDT. However, people were careless and extravagant in their use of DDT and related pesticides. Since these pesticides last for long periods of time, the amounts in our environment have been steadily rising until now we have very high levels of pesticides in our soils and atmosphere. It is only recently

that the general public has become aware of the dangerous effects these pesticides are having on our environment. They are toxic not only to man but to other forms of wildlife. They are destroying much that was not meant to be their target, often at great distances from the point of application.

Paul then asked if anything was being done to stop the use of DDT. Dr. Lewis replied, "A few states have attempted to control the use of DDT. Our state is not one of them. However, there are groups working for the passage of such a law in our state right now. You could contact them and find out how much effect their efforts have had." Dr. Lewis gave Paul a name and telephone number for the group. Paul wrote it down as Dr. Lewis continued.

"However, Paul, DDT is the most famous but it is not the only dangerous pesticide in our environment. There are others and they include dieldrin, lindane, chlordane, heptachlor, endrin, aldrin, BHD, 2-4-5-T, 2-4-D, taxaphene, and any compound containing lead, mercury, or arsenic. These pesticides should not be used under any circumstances."

"Are there any pesticides a person can use safely?" asked Paul.

"Just a few brands including Rotenone, Sevin, Malathion, Pyrethrum and Methoxychlor are recommended," answered Dr. Lewis. "However, pesticides probably are not necessary in most homes. If house plants are infected with insect pests, they can be cured by washing the plant with tobacco water and a mild soap. For outdoor plants, infestation can be avoided by planting a mixture of trees, shrubs, or garden plants instead of only one kind. Once a plant becomes infested it should be removed and destroyed to prevent further spreading of the disease."

So Paul left Dr. Lewis and went directly to a garden supply store in his neighborhood. He checked the labels on several pesticides carefully. Two brands contained dangerous ingredients, and one contained an ingredient recommended by Dr. Lewis. He wondered if all stores had greater choices of

undesirable pesticides than desirable pesticides. A survey would answer that question. His community was really too large for Paul to conduct so large a survey on his own. Kids in his class at school came from all parts of the community.

'Maybe I could get the class to help," thought Paul.

Paul's teacher was very anxious to help Paul and suggested he see what the rest of the class thought. So Paul talked to the class about his experiment and what he wanted to do now. Everyone was eager to help.

The class developed the following survey form:

Store Name _____ Date _____

Address _____

List Brand Name of Pesticides	Dangerous Ingredients										Recommended Ingredients				
	DDT	Dieldrin	Lindane	Chlordane	Heptachlor	Endrin	Aldrin	BHD	245T	24D	Rotenone	Sevin	Malathion	Pyrethrum	Methoxychlor

Each student took several forms and surveyed the grocery stores, hardware store, drugstore, department stores, and garden supply stores in his section of the community.

They also decided to ask the store manager to help them with their study. They wanted him to keep track of the numbers of each type of pesticide he sold.

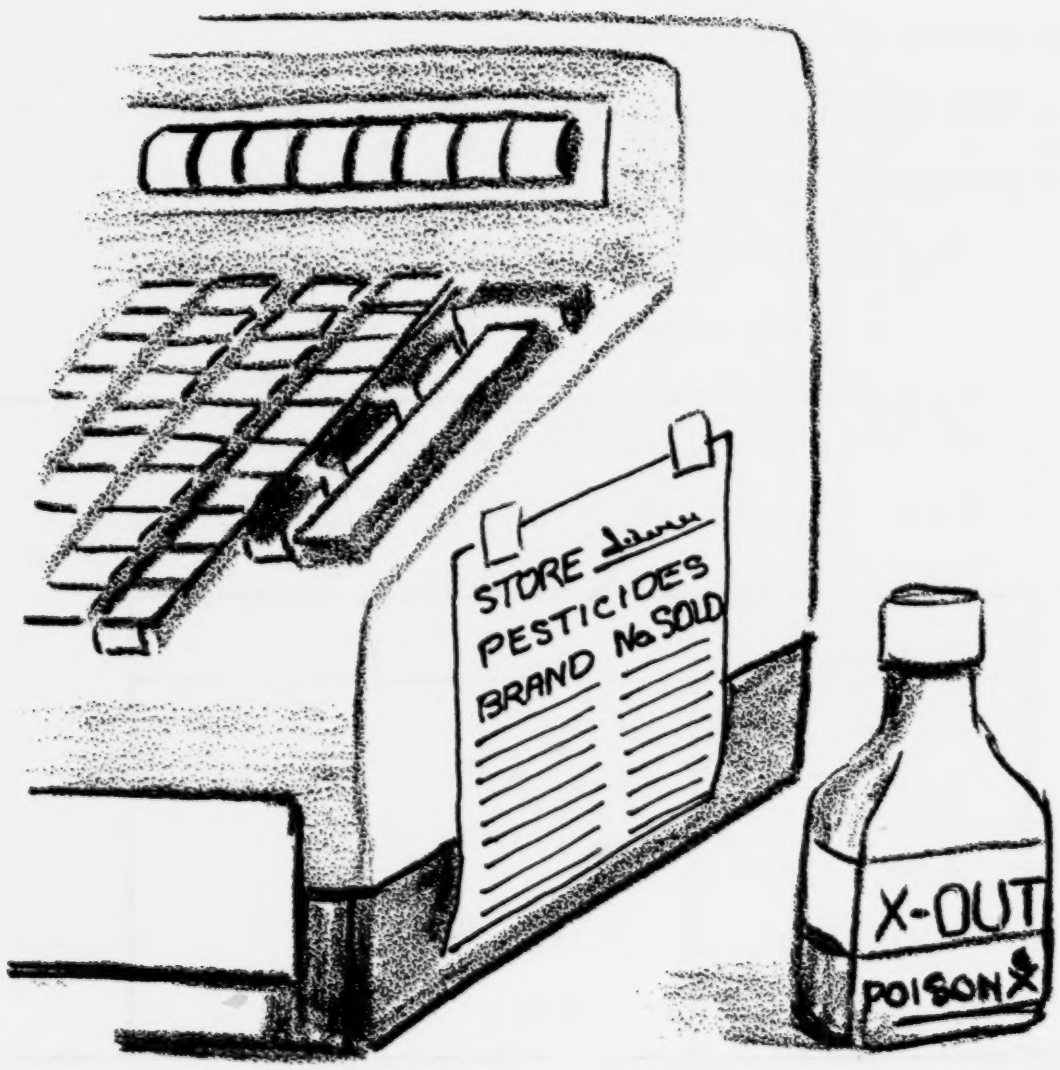
Most store managers agreed to do this. They hung a list of their pesticides beside the cash register and clerks made a mark for each one sold. For example, in one store the following list was compiled by the store clerks:

Store Name Hanson's Farm & Garden

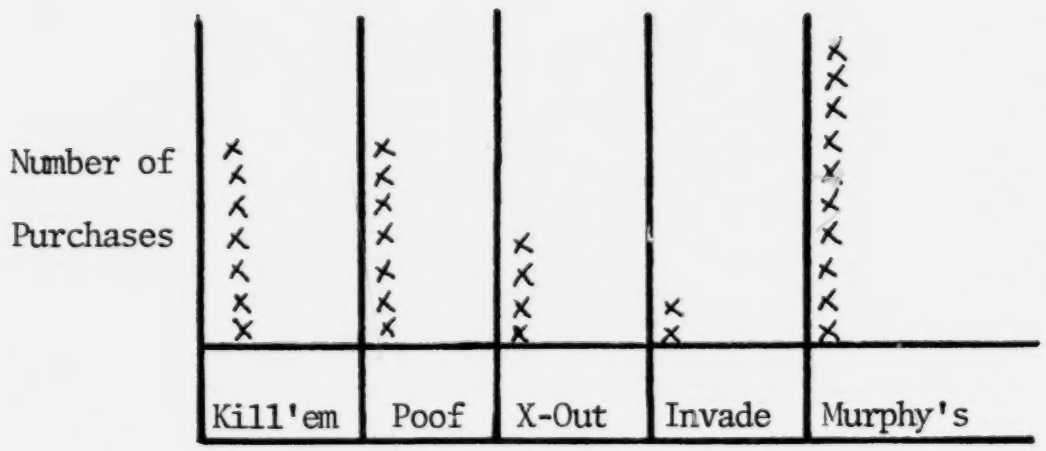
Address 1900 Sun Street

Pesticides Sold

Brand Name	No. Sold
Kill'em	111
Poof	~~𝍸~~ 1
X-Out	1
Invade	~~𝍸~~ ~~𝍸~~
Murphy's	1111


STORE
PESTICIDES
BRAND No SOLD
X-OUT
POISON

At the end of two weeks the class collected the lists of brands purchased from the stores and put the lists together with the other information they had gathered. They made a graph of all the brands purchased in the entire community.



They made one composite chart showing all the brands names and their contents.

Brand Name	Dangerous Ingredient	Recommended Ingredient
Kill'em		
Poof		
X-Out		
Invade		
Murphy's		

The Community Campaign

The class made the following bulletin:

Danger: You may be harboring a killer in your home!!

Pesticides are endangering the wildlife and human life in our nation.

There is evidence that pesticides might cause disease, according to the National Cancer Institute.

Under no circumstances use brands containing the following chemicals:

Dieldrin	Endrin	2-4-5-T
Chlordane	Taxaphene	2-4-D
Lindane	Aldrin	or any compound containing lead, mercury, or arsenic
Heptachlor	BHD	

Avoid using pesticides by planting a mixture of shrubbery and outdoor plants instead of many of one kind. Infected house plants can be helped by washing them with tobacco water and soap.

If you must use pesticides, select those brands containing:

Rotenone	Pyrethrum
Sevin	Methoxychlor
Malathion	

16

They made hundreds of copies and distributed them throughout the community.

They handed them out on street corners, in shopping centers and in busy public places.

They made posters and displayed them in public buildings. They made picket signs from some of their posters and marched in downtown areas.

Some of the posters the class made are shown below:

60% OF THE WORLD'S OXYGEN
IS PRODUCED BY MARINE PLANKTON
DDT IS REDUCING THIS PRODUCTION
BY DESTROYING MARINE PLANKTON
BAN DDT ! ! ! !

VERY TINY CONCENTRATIONS OF PESTICIDES IN
SEA WATER CAUSE:
DEATH OF SHRIMP POPULATIONS!
DEATH OF OYSTER POPULATIONS!

DDT - COMPOUND OF EXTINCTION

MASSIVE FISH KILL IN LOWER MISSISSIPPI

CAUSED BY

ENDRIN

BAN PESTICIDES CONTAINING ENDRIN!

A MILLION COHO SALMON KILLED IN

MICHIGAN BY

DDT

BAN DDT!!

- ELM TREES SPRAYED WITH DDT TO STOP DUTCH ELM DISEASE
- LEAVES FROM ELMS EATEN BY EARTHWORMS; DDT ENTERS EARTHWORM
- ROBINS EAT EARTHWORMS; DDT ENTERS ROBINS

DEAD ROBINS!!!

BAN DDT

PESTICIDES ACCUMULATE IN PLANKTON

FISH EAT PLANKTON

BIRDS EAT FISH

BIRDS CAN'T PRODUCE OFFSPRING!!!!

BALD EAGLES, OSPREY, PEREGRINE FALCON,

SPARROW HAWK, PELICAN

SWEDEN BANS

ALDRIN

DIELDRIN

DDT

RESTRICTS LINDANE

EVEN PENGUINS IN THE ANTARCTIC

CONTAIN DDT

BAN DDT!!

20

PESTICIDES MIGHT CAUSE DISEASE!!

ACCORDING TO NATIONAL CANCER INSTITUTE

BAN DDT

BAN DIELDRIN

BAN LINDANE

BAN CHLORDANE

BAN HEPTACHLOR

BAN ENDRIN

BAN ALDRIN

UNIVERSITY OF WISCONSIN REPORTS PESTICIDES MIGHT PRODUCE MUTATIONS!!!

BAN DDT
BAN DIELDRIN
BAN LINDANE
BAN CHLORDANE
BAN HEPTACHLOR
BAN ENDRIN
BAN ALDRIN

OVER 150 INSECTS

FORMERLY CONTROLLED BY DDT

HAVE DEVELOPED STRAINS WHICH ARE NOW

RESISTANT TO IT,

BAN DDT

D.D.T. MOVES ACROSS PLACENTA SO

BABIES BORN WITH A LEVEL OF D.D.T.

BAN DDT

OUR CORAL REEFS ARE BEING DEVOURED

BY STARFISH!!

PESTICIDES HAVE HELPED DESTROY THE

PREDATOR WHICH CONTROLLED THE STAR FISH POPULATION.

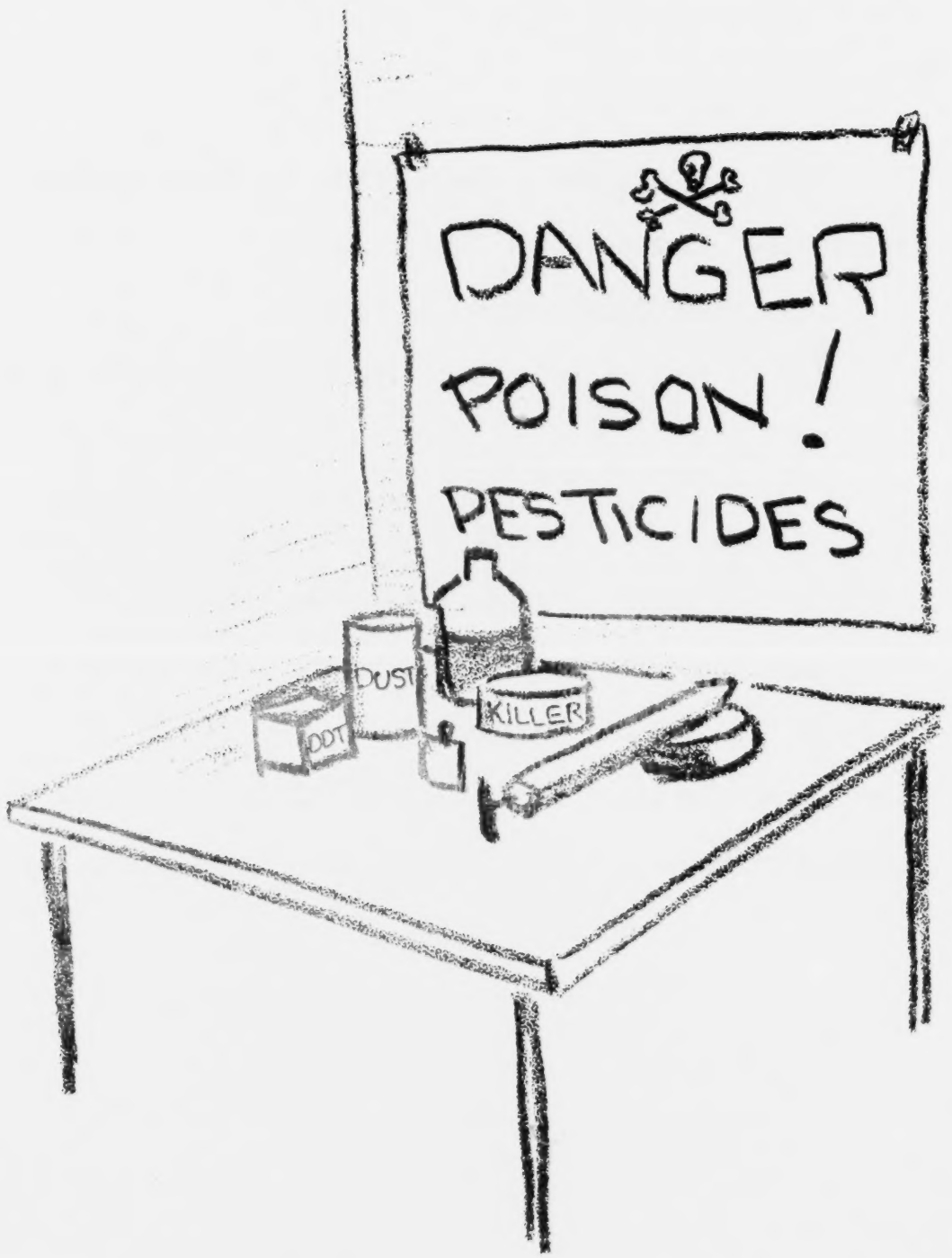
THE STARFISH POPULATION HAS EXPLODED!!

BAN PESTICIDES!!!

MOTHERS' BREAST MILK HAS A HIGHER CONTENT OF DDT THAN IS ALLOWED IN COWS MILK.

BAN DDT!!!

When the campaign had been going on for a week, they started getting requests from people in the community. The requests were for information on how to dispose of the dangerous pesticides they had in their homes. The class contacted the public Health Center by calling the City Hall and getting their phone number. The Department warned "DO NOT POUR THE PESTICIDES DOWN YOUR SINK, AS THEY EVENTUALLY REACH WATER SUPPLIES. The Health Center offered to dispose of the pesticides for them by proper incineration. To aid in this the class became a collecting station for the pesticides. People brought them to the school or gave them to members of the class. A volunteer parent loaded the collection of pesticides in his station wagon and took them from the school to the Health Department.


DANGER
POISON!
PESTICIDES
DUST
DDT
KILLER

They each started a chain letter to three friends or relatives. In the letter they included:

(1) The bulletin shown on Page 15

(2) A list of federal congressmen from their state and addresses they can be reached at.

(3) A note urging the recipient to write to the congressman asking for pesticide ban legislation. The person also is asked to continue the chain letter by sending the information to three of their friends or relatives.

They found the information in the chart on the following page in the National Audubon Magazine for March 1970. They reproduced the chart and handed it out to people from the community who were having trouble with these garden insects.

Aphids	Can often be washed off; otherwise, use nicotine sulphate,pyrethrum,rotenone,malathion.
Caterpillars	Rotenone,Diazinon,methoxychlor,or carbaryl Sevin
Chiggers	Malathion
Chinch bugs	Diazinon, Sevin
Cutworms	Diazinon, Sevin
Earwigs	Try desiccants in dry places;chlordane for very difficult areas, but in small amounts.
Grasshoppers	Diazinon, Sevin
Janpanese beetles	Milky spore disease (order from Fairfax Biological Laboratory,Clinton Corners,New York) for soil grubs; malathion or Sevin for adults.
Lawn moths	Diazinon
Mites (red spiders)	Oil spray, hot water
Scale insects	Diazinon, malathion, Sevin
Spittlebugs	Malathion, Sevin
Thrips	Nicotine sulphate,Diazinon,malathion,rotenone
Wireworms	Diazinon
Wood borers	Diazinon
(Note: Diazinon (Spectracide) is a broad-spectrum, reasonably short-lived phosphate that does not build up in food chains. It is thus broadly effective. But, like Baytex, it has a peculiarly increased toxicity to birds; hence, do not spray a bush that may have an active bird's nest.)	

A Challenge For You

At the conclusion of their campaign, the kids re-surveyed the stores in their community. They found out the numbers and kinds of pesticides sold now that they had "educated" the community. The same kind of graphs and charts were made for this second survey. These graphs and charts were compared with those made before their campaign. What do you think they found out?

Try this study and campaign in your class at school. How can you cause a change to happen in your community? What can you do to save animal & plant life from the danger of pesticides?

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31

TROUBLESOME TAIL PIPES

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TROUBLESOME TAILPIPES

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In Give Earth A Chance Series

Dirty Air

Trash Is Taking Over

Sounds and Silence

Pesticides Are Perilous

Tragedy in the Laundromat

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to promote an understanding of the environmental crisis and to form a basis for effective and constructive action by individuals.

"Our car doesn't use gasoline like your car does," said Paul.

"I don't believe you. That's impossible. Even Glenn knows better than that," said Gordy. "All cars use gas! And my Dad's motorcycle uses gas, and the snowmobile uses gas, and the lawn mower uses gas, and Uncle Ken's motor boat uses gas, and airplanes use gas. All motors use gas...I think."

"All motors use gas...I think," repeated Gordy's little brother Glenn.

"Not our car. Our car uses propane," said Paul.

"Why? Why does your car use propane?" challenged Gordy.

At that time they were crossing a busy intersection. A beat up old car had pulled part way into the intersection and stalled. The light changed and the driver was trying frantically to get it started. The boys had to walk out of the crosswalk to get around the back end of the car. Just as they

passed, the old car coughed, sputtered and started to run with racket that sounded like half a gasp and half a wheeze. A large cloud of black exhaust burst from the tail pipe catching short little Glenn right in the face. He choked on the smoke, rubbed his eyes, and started to cry. Gordy grabbed his hand and pulled him the rest of the way across the street.

"That's why," shouted Paul when they reached the sidewalk. He pointed an accusing finger at the poor old car as it chugged down the street, spewing black exhaust from its tail pipe. "That's why we use propane instead of gas. Our exhaust doesn't have as much bad stuff in it as your car," he added.

"My car doesn't have black smoke like that either," argued Gordy.

"No, it doesn't," piped Glenn.

"I know, but it's got more than <u>our</u> car! When we get to my house, Dad will tell you about the stuff that's in your car exhaust that isn't in ours," said Paul.

Mr. Anderson did tell the boys all about his "propane burning" car and how he got it. A lot of what he told them they didn't understand.

Mr. Anderson told them his company uses propane fuel in a plant operation and also to heat and air condition their offices and plants. The company became concerned about air pollution so they converted company vehicles to a double fuel system, one to use filling station gas and one to use propane gas. They also assisted employees, such as Mr. Anderson, in having their cars converted to the double fuel system. It cost about $200.00 to have the car fixed up. As a result, Mr. Anderson explained, his car gives off much less harmful exhaust when burning propane gas then when he burns filling station gas.

Gordy still wasn't convinced that Paul's car was so great, so the next day they asked their teacher how harmful pollution from car exhaust is to people. He could not answer but made arrangements for a man from the Pollution Control Agency to visit the class and answer questions.

THE VISITOR

Mr. Harrison from Pollution Control came to the class on Thursday. The class had a lot of questions for him.

Mr. Harrison said, "Automobiles are the major source of hydrocarbons, oxides of nitrogen and carbon monoxide emissions to the atmosphere of our cities". Since no one understood what these odd words meant he explained each of them more completely.

Hydrocarbons

Hydrocarbons are unburned parts of the gas molecule. One potent hydrocarbon is the same substance used in labs by scientists to cause cancer in rats. It is one of the most dangerous cancer-producing substances in our air.

Hydrocarbons combine with nitrogen normally in the air to form air pollution like the famous smog of Los Angeles. Part of this smog is called "ozone". Ozone

in air pollution causes headache, fatigue, difficult breath-breathing, reduction of vision, smarting burning eyes and throat if it is present in large enough amounts.

Oxides of Nitrogen

Oxides of nitrogen from exhaust also combine to form air pollution. Nitrogen dioxide is an oxide of nitrogen.

Nitrogen dioxide is responsible for the whiskey brown haze over many of our cities. This reduces visibility.

Scientific studies with mice seem to show that nitrogen dioxide reduces resistance to infections. Pneumonia was one infection the mice acquired easily.

Carbon Monoxide

Carbon monoxide is a colorless, odorless, tasteless gas given off by cars. Carbon monoxide cuts off the oxygen supply to the blood because the blood takes up

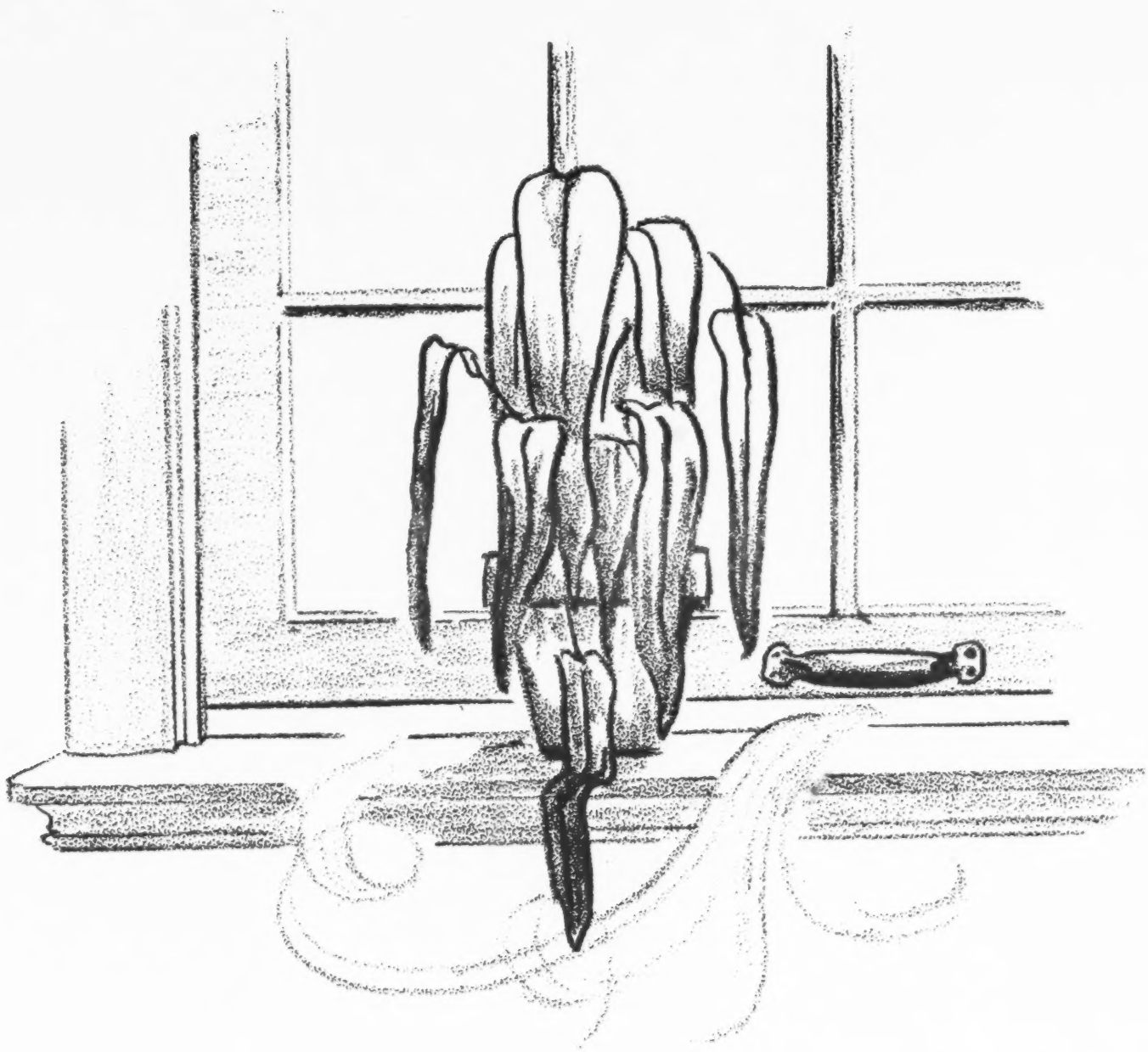
carbon monoxide more easily than oxygen. So carbon monoxide replaces the oxygen that normally is carried by the blood. However, carbon monoxide cannot be used like oxygen. This affects the brain and nerves. In large doses, it kills. (It is carbon monoxide which kills the person caught in a closed garage with the car running.) In lesser doses, it causes upset stomach, dizziness, headaches and harm judgement.

Carbon monoxide enters the passenger area of the car whenever it is running. It is especially dangerous when the traffic is heavy, the cars are at a standstill, or in tunnels.

Lead

You have probably heard of lead poisoning in children which causes brain damage and even death. It also impairs the nervous system of adults. Most of the lead in our atmosphere is emitted by motor vehicles.

8



Plants are even more sensitive to air pollution than people. Many city dwellers have given up trying to grow certain house plants when the level of air pollution rose in their city.

The class asked Mr. Harrison if cars gave off very much of these chemicals. They didn't see how their family car could be doing the things Mr. Harrison spoke about.

"It must be everyone else's car but not ours," was their feeling.

So Mr. Harrison gave them the following chart. They were amazed at the amounts of the different gases given off when a car burns a 1000 gallons of gas.

Emissions in Exhaust	
Type of Emission	Pounds per 1000 gals. of gas
Hydrocarbons	200 lbs.
Oxides of Nitrogen	113 lbs.
Carbon Monoxide	2,300 lbs.

Mr. Harrison explained that the figures given in the table are only average amounts. The amount of emissions depends greatly upon where the car is being driven (in the mountains, desert, etc.), the average speed it is driven, the condition of the car, and how heavy the drivers foot is on the gas pedal when starting from a standstill.

Paul asked Mr. Harrison about his dad's propane gas burning car. He answered that the amounts of emissions are reduced greatly. Instead of 2,300 lbs. of carbon monoxide, Paul's car gives off 322 lbs. Instead of 200 lbs. of hydrocarbons, Paul's car gives off 114 lbs. Instead of 113 lbs. of oxides of nitrogen, Paul's car gives off 26 lbs. The cost of propane and the gas mileage a car gets is comparable to filling station gas. Also propane gas seems to reduce engine wear.

"It is difficult to get the car changed over to burn propane fuel. It's even more difficult to buy the propane to run the car on!" added Mr. Harrison.

Their Plan

The class decided to find out how much Hydrocarbons, oxides of nitrogen, and Carbon Monoxide was emitted by the families of their class in one year.

They found out the number of gallons used per week by each family.

They used the following charts and formulas to figure this out.

Family name _____

Day Tank First Filled M T W T F
Circle One

Record amount of gas each time you fill your tank except the first time. Completely fill your tank again one week after your first fill.

Day	Number of Gallons
M	
T	
W	
T	
F	
S	
S	
	Total Gallons for week _____

They added the totals for all the charts together and found the total number of gallons burned by all the families in the class. With this figure they made the following calculations:

Total gallons burned for a week for class families.	X	52 No. of weeks in a year.	=	Approx. gals. burned in one year by all families.

To find the number of pounds of hydrocarbons produced by their families in one year, they referred to Mr. Harrison's chart. (See pg. 9.) The amount was 200 lbs. per 1000 gallons of gas burned.

Approx. gals. burned in one year by class families.	÷	1000 No. of gals. per 200 lbs. of hydrocarbons.	=	No. of times 200 lbs. of hydrocarbons have been emitted.

No. of times 200 lbs. of hydrocarbons have been emitted.	X	200 No. of pounds of hydrocarbons per 1000 miles.	=	No. of pounds hydrocarbons emitted by their families in one year.

They made similar calculations to find the number of pounds of oxides of nitrogen produced. (113 lbs. per 1000 gallons of gas burned.)

They made similar calculations to find the number of pounds of carbon monoxide produced. (2,300 lbs. per 1000 gallons of gas burned.)

The Campaign

The kids put together a community campaign to cut down on air pollution by exhaust.

Their teacher printed the auto check list found on pages and which the kids gave to all households in the community.

Along with the check list the class made an information sheet of things people could do to cut down the amount of pollution they were causing. This information sheet is shown on page 16.

Your car is polluting the air you breathe!!

Cut down on pollution by following this three month check list.

Every three months have the following parts of your car checked, adjusted or replaced.

Part	Date of checkup___ First three months			Date of checkup___ Second three months			Date of checkup___ Third three months			Date of checkup___ Fourth three months		
	OK	Adjusted	Repl.	OK	Adjusted	Repl.	OK	Adjusted	Repl.	OK	Adjusted	Repl.
Carburetor												
Fuel Pump Gasket												
Timing Blow-by Valves												
Fuel Tank												
Filler Tank Cap Gasket												
Oil Filter Cartridge												
Spark Plugs												
Cooling System and Thermostat												
PTC Valve												
Exhaust System												
Air Filter												
Spark Plug Wires												
Points and condenser												
Auto. Timing Adv. System												

Cars Cause 62% of U.S. Air Pollution

You can cut this amount down by doing the following things:

1. Follow the three month car check-up plan you received with this sheet.
2. Operate your car properly. Avoid quick stops and starts, racing the motor. Jamming on brakes will cause particles of brake linings and rubber particles from the tires to be thrown into the atmosphere.
3. Use public transportation or walk whenever possible.
4. Organize car pools for going to work or making other regular trips.
5. When you buy a new car, buy a small, low horsepower car. These small cars use less gasoline and cause less pollution.
6. Write to your legislators asking more powerful laws restricting pollution by automobile to a more tolerable level.
7. Write to automobile manufacturers asking them to develop pollution control devises and engines which burn gasoline more completely.
8. Write to gasoline companies asking them to produce lead free gasoline.
9. Buy and install exhaust control devises. These devises decrease the amount of hydrocarbons emitted by 35% and decrease the amount of carbon monoxide by 67%. However, they increase the amount of oxides of nitrogen by 26%.
10. Urge car manufacturers to produce propane burning cars, and oil companies to provide propane gas at their filling stations.
11. Encourage your friends and neighbors to take these same steps.

TRAGEDY IN THE LAUNDROMAT

THE CASE OF THE FERTILIZING PHOSPHATES

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TRAGEDY IN THE LAUNDROMAT

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In Give Earth A Chance Series

Dirty Air

Trash Is Taking Over

Sounds and Silence

Pesticides Are Perilous

Tragedy in the Laundromat

Troublesome Tail Pipes

"GIVE EARTH A CHANCE"

A series of booklets produced by the

Environmental Science Center
5400 Glenwood Avenue
Golden Valley, Minnesota 55422

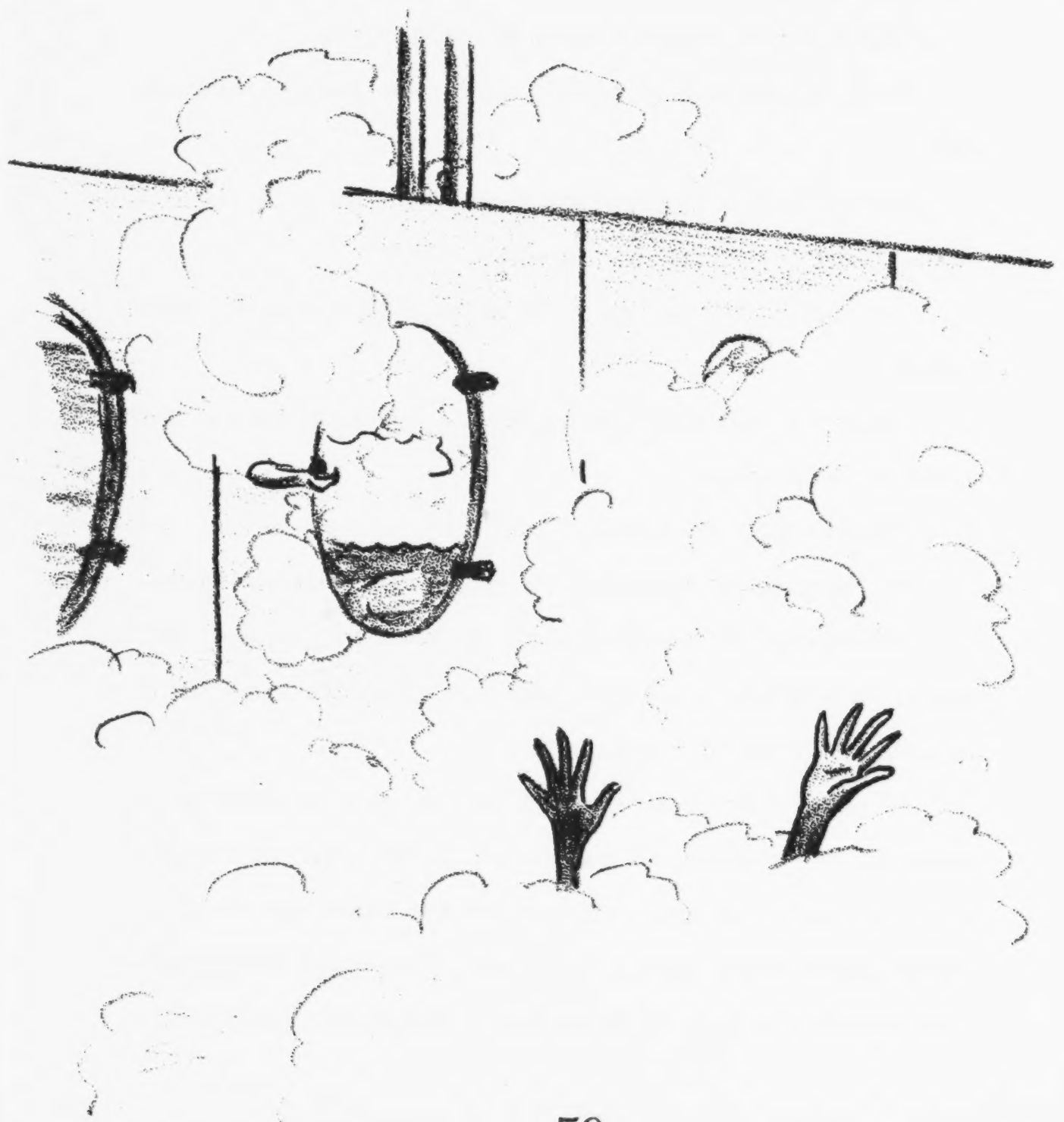
to promote an understanding of the environmental crisis and to form a basis for effective and constructive action by individuals.

Such a mess Kari had never seen before! There were mountains of foaming, gushing, bubbling suds pushing up from the hole around the pipes. There were suds swallowing the washing machine! And Karla! Karla was unbelievable. Her hair was wet and stringy. Fluffs of suds clung to her face, hands and clothes. The creeping mass of suds continued to increase and Karla and Kari's battle to keep them down wasn't working. Kari and Karla were snatching up arm loads of soap suds, running to the sink and washing them down the drain. It was a painstakingly slow process and the growing mass of

suds was winning the race. Karla and Kari suddenly had visions of the laundromat filled to the doors with soap suds. It struck them both as being a very funny sight. They stopped their work and started laughing over the strange and funny situation they had gotten themselves into. It was a very poor time to stop working and start laughing. For just as they were at the height of hysterical laughter, in walked Mr. Washington, owner of the laundromat. He did not find the flowing soap suds quite so funny. His first move was to turn off the washing machine. His second move was to search out mops and buckets for three people.

Karla, Kari and Mr. Washington sopped up the soap suds and then completely washed the floor of the laundromat. Mr. Washington had worked out most of his irritation with the girls by the time they finished the floor.

He bought a round of pop and they sat resting around the clothes folding table.



"How did this happen?" asked Mr. Washington.

"It's all because of Karla's dirty blue jeans," answered Kari.

Mr. Washington chuckled and said, "That can't be the whole story. What kind of soap did you use?"

Kari pulled out the box of detergent and showed Mr. Washington.

"That's a very high sudsing brand. How much did you use?" asked Mr. Washington.

"Three cups," answered Karla.

Mr. Washington couldn't keep from laughing at the girls.

"Three cups is enough to wash six loads of clothes! Besides, we have very soft water and that makes the soap suds up even more," he told them.

He named a low sudsing brand and the sisters vowed they would ask their mother to buy the low sudser when they bought groceries next. As they were leaving the laundromat Mr. Washington called after them, "By the way, I've heard that brand I recommended is high in phosphates. Phosphates cause water

pollution. Maybe you should check into that before you decide to use that brand.

The next day at school Karla asked her teacher about Mr. Washington's parting comment.

"What are phosphates and why are they bad for the environment and why does Mr. Washington's recommended brand contain a lot of phosphates?" Karla asked.

"I thought all detergents were bio-degradable and all right to use," answered Karla's teacher, Mrs. Scott. "Why don't you see Tom Anderson at the College. I'm sure he can answer your questions."

That day after school Kari and Karla visited Mr. Anderson. Mr. Anderson answered their questions by saying, "A great deal of water pollution comes from the phosphates in the detergents you use. A high phosphate soap is often a low sudser and vice versa. Phosphates are fertilizers which feed the algae and water plants.

PHOSPHATES FERTILIZE THE ALGAE AND VEGETATION, MAKING THE GREEN SCUM THAT BORDERS OUR LAKES AND RIVERS. In the old days

of soap, this problem did not occur. Soaps don't contain the great amounts of phosphates found in detergents. Some detergent companies are proud of their "bio-degradable" detergents. Bio-degradable means the detergents can be decomposed or broken down by bacteria. But phosphates are not affected by this. All the phosphates are still released into the water.

"I didn't know there was a difference between soap and detergent. Can we buy soaps instead of detergents?" asked Karla.

"Yes you can," answered Mr. Anderson. "Soap, such as Lux, Ivory Snow and Maple Leaf are available."

"There are some detergents with a low amount of phosphate. Here is a list of detergents and their percentages of phosphates," offered Mr. Anderson. (See page 15)

DETERGENTS AREN'T THE ONLY PROBLEM ...

Mr. Anderson went on to say, "Detergents are not the only problem. Many lawn fertilizers contain great amounts of phosphate. People use the fertilizers on their lawns. Rain washes these fertilizers directly into streams or lakes. Rain also washes the fertilizers into storm sewer systems. These systems usually dump their contents into some body of water. These fertilizers work better on water plants and algae than they do on your lawn!"

"People could help starve the algae and water plants by using fertilizers that are low or free of phosphates," he continued.

Mr. Anderson mentioned a couple of fertilizers that are phosphate free.

"The soils in our city are generally high in phosphates already. Most people don't need phosphates in the fertilizers. If people feel they need phosphate containing fertilizers they should first have their soils tested to find out for sure if they need them. After having their soil tested they can better pick a fertilizer suited to their needs.

Karla and Kari took the information on detergents and fertilizer back to their classes and asked if there wasn't something their classes could do to help with the problem. Their teachers were very anxious to help and asked them to tell their story to their classmates.

Both classes wanted to help Karla and Kari do something about the fertilizing phosphates. The classes decided to work together on a plan. The goal of their plan was to cause people in their community to buy soaps, detergents and fertilizer free of or low in phosphate content.

What Brands Are People Buying Now?

First, the two classes surveyed community grocery stores and garden supply markets such as hardware stores, etc., to see how much of each product was being sold. They surveyed grocery stores for detergents, and garden supply stores for fertilizers. The store manager was first con tacted and asked if they could come to the store during their busy hours and see what brands of detergents or fertilizers were being bought. The store manager suggested some hours when his store was busiest for them to conduct the survey.

They used the check sheets on the following page for recording information. In the first column they recorded the brand name of all laundry products or fertilizers sold by the store. In the second column they placed a check mark for each time that brand was purchased.

The tally sheet for fertilizers contained a third column. In this column the students listed the per cent of

phosphate in that brand of fertilizer. Unlike the detergents, the fertilizers carried this information on their label.

In some garden supply stores, the managers agreed to have their clerks keep track of the number of each brand they sold. The list was kept conveniently by the cash register.

Brand Name of Laundry Product	No. Times Purchased

Brand Name of Fertilizer	No.Times Purchased	% Phosphate (found on label)

What Did the Survey Show?

On their survey the classes listed the laundry products most frequently bought in their community. They then checked the phosphate content of these laundry products and found the majority of these popular laundry products were high in phosphate content. They got the phosphate content information from the list Mr. Anderson gave them. This list is shown on page 15.

The classes listed the fertilizers bought most often in their community. They found these to be very high in phosphate content also.

COMMUNITY CAMPAIGN

The class made posters for the school showing the dangers of phosphates in water.

They urged kids to have their parents buy laundry soap or low phosphate detergents.

They ran off enough copies of the list of laundry products Mr. Anderson gave them so each student in the school could take one home. This list is shown on page 15.

They tacked the list in all laundromats and handed them out to friends and neighbors in their community in a door to door campaign.

Fertilizing Phosphates - Help Us Stop Them *

Phosphate pollution over-fertilizes water. Algae prosper and consume water's oxygen. Plants and fish, and eventually water, die. The fate of a dead body of water is a swamp.

Manufacturer and Product	%	Manufacturer and Product	%
Heavy Duty Laundry Detergent		**Heavy Duty Laundry Detergent**	
Amway, Amway Trizyne	52.5	Witco Chem. Co.,Explore	26
Colgate Palmolive, Bio-Ad	49	Maleo Prods.Inc.,Maleo	25
Sep-KO Chems., Pert	47	Lever Bros., Wisk	10.5
Proctor & Gamble, Cheer	44.5	**Laundry Soaps**	
P & G, Oxydol	44.5		
P & G, Tide XK	43.5	Purex Corp., Instant Fels	9
Lever Bros., Drive	41.5	Lever Bros., Lux	x
Lever Bros., All	39	Canada Packers, Maple Leaf Soap Flakes	x
Amway, Amway SA8	36.5	P & G, Ivory Snow	x
Colgate Palmolive Arctic Power	36.5	**Light Duty Compounds**	
Colgate Palmolive, Ajax 2	36		
Lever Bros., Omo	35	P & G, Dreft	34
P & G, Duz	35	Boyle Midway, Zero	7.5
P & G, Bold	32.5	Witco, Explore Liquid	x
Lever Bros., Surf	32.5	Bestline Prods., Inc. Bestline Liq. Conc.	x
Lever Bros., Breeze	32	Con-Stand Inc., Nutri Clean OLC	x
Lever Bros., Amaze	27		
Bestline Products, Inc. Bestline B7	27		

These percentages may vary by + or - 10%

(List prepared by Pollution Probe, A University of Toronto group.)

*Whole Earth Catalog, March 1970, Menlo Park, California, Pg. 10.

Mr. Anderson had told Karla and Kari the soil in their community generally contained high phosphate level. The results of their survey showed that people were adding large amounts of phosphates to their soil in the fertilizers they used. The class decided that too much phosphate was probably being used.

They decided to become a soil test center for the community. A small donation by each class member purchased a soil test kit. They bought it at a garden supply store. It was very easy to use. If you can't get one at a local store you can order yours from:

LaMotte Chemical Products Co.
Educational Products Division
Chestertown, Maryland 21620

Ask for the Model E.L. Soil Test Kit, code number 5679. Enclose a check for $9.95.

The class passed out the following guidelines to all students in the school. They also handed them out to friends and neighbors all over the community.

MILLORGANITE

GUIDELINES FOR USE OF FERTILIZERS

1. If you must fertilize, buy and use a fertilizer prepared by a sewage disposal plant or from other animal feces. Milorganite is such a fertilizer.
2. Follow package directions carefully.
3. Be sure no fertilizer is left on hard surfaces, driveways, sidewalks, etc; sweep it onto the soil.
4. Have the soil tested by the 4th or 5th grade class at Lincoln Elementary School. We can tell you how much nitrate, phosphate and potash you need to add to your soil. You can then better select a fertilizer.

A news release was prepared and taken to their community newspaper by the class. The newspaper ran an article on the class project, thus helping publicize their campaign.

What Brands Are Informed People Buying

Three weeks after their campaign was completed they re-surveyed the grocery stores and the garden supply stores. The forms they used were the same as the ones used for the pre-campaign survey. The result seemed to be a great decrease in the number of detergents and fertilizers sold with a high phosphate content.

The class was curious to know how lasting their efforts would be. So six weeks after their campaign was completed, they again surveyed the stores.

What do you think they found when they re-surveyed after this long a time? What would happen if your class tried the same project? How could you change the buying habits of your community? Try it and see. Our rivers and lakes need your help.

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TRASH IS TAKING OVER

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T R A S H I S T A K I N G O V E R

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IN GIVE EARTH A CHANCE SERIES

DIRTY AIR

TRASH IS TAKING OVER

SOUNDS AND SILENCE

PESTICIDES ARE PERILOUS

TRAGEDY IN THE LAUNDROMAT

TROUBLESOME TAIL PIPES

"GIVE EARTH A CHANCE"

A series of booklets produced by the

Environmental Science Center
5400 Glenwood Avenue
Golden Valley, Minnesota 55422

to promote an understanding of the environmental crisis and to form a basis for effective and constructive action by individuals.

It was a hot day in July when Ned, Mary and Christy decided to go on a picnic. Mary brought the hot dogs, Christy brought potato chips, and Ned brought the pop. They crammed the food into the basket on Ned's bike and carefully tied it down. Off they rode to Crystal Lake. Because it was a hot day and the lake was quite a distance to ride, they stopped about halfway.

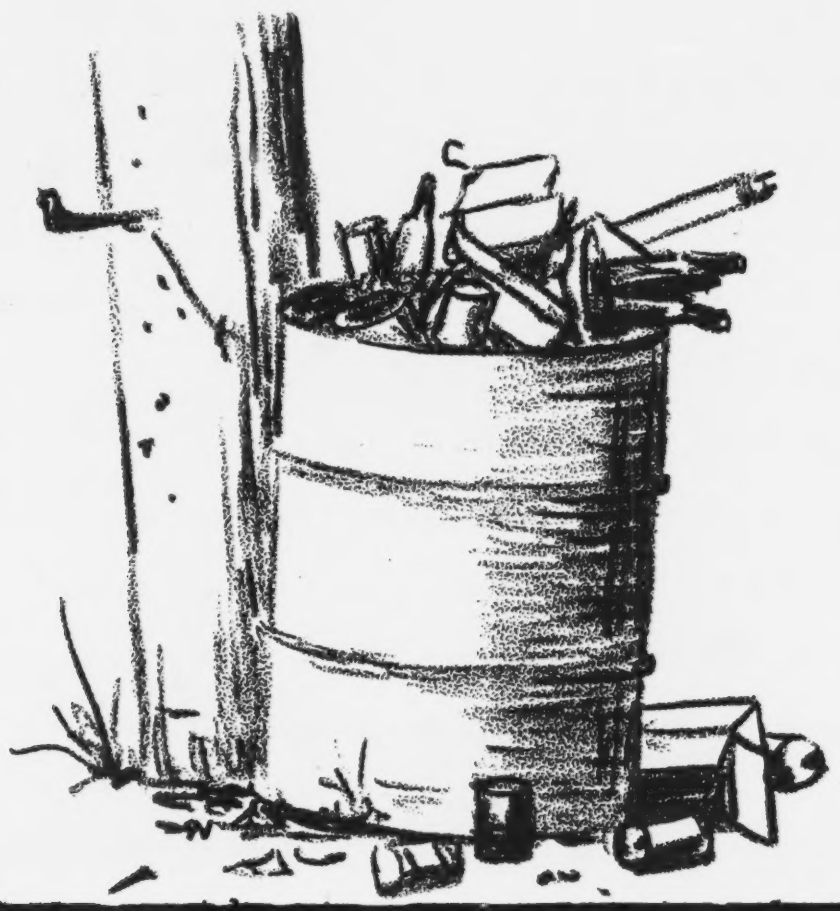
Mary was complaining, "I'm tired; I have to rest." So they pushed their bikes off the road and sat down under a huge, shady old oak tree and relaxed in the soft, cool grass.

"A can of pop would sure taste good," said Christy. Ned agreed and untied the sack of food, removed three cans of pop, and retied the sack securely to the bike. The pop was still cold and really cured their thirst!

'What do we do with the cans?" asked Mary.

"I'm not untying that sack again!" replied Ned. "Just set them behind the tree. Nobody will see them there." So the cans were left behind the tree in the soft, cool grass and the three picnicers went on their way.

The picnic area was quite a surprise however. It was a popular place in the community and had been used heavily during the hot summer weather. It was a mess!! Picnic left-overs, bags, napkins, pop cans, non-returnable bottles, tin foil, bones and other debri was strewn over the area. They were quite shocked and stood looking at the area in stunned silence for a few seconds.



"You know what I'm thinking of?" said Ned.

"What?" asked Mary.

"Those pop cans we left behind the tree. We did the same thing the people who left this mess did. Let's clean it up before we eat."

So the three of them collected the trash and stuffed it into the already bulging trash cans.

Then they sat down to lunch, and some serious thinking.

"What happens to all that trash?" mused Christy.

"Well the paper stuff burns, and I suppose some of the food does too. Most food probably rots away", answered Ned, "but I'm sure you can't burn cans and bottles. That stuff must be dumped someplace."

Mary said, "Our family buys returnable bottles and they are used again. I wonder why all the pop companies don't do that."

"Let's find out how many cans and bottles our families throw away during the week", suggested Christy.

Their Plan

After the picnic and a refreshing swim they went to Christy's house to plan their study. On the way home they stopped and picked up three pop cans from behind an oak tree!

They called four more friends and asked them if they would help with the trash survey and explained what to do.

Their mothers helped them keep records at home. A group record was kept at Christy's house. After a week they had the following chart completed:

Number of cans and bottles thrown away

	Sun.	Mon.	Tues.	Wed.	Thurs	Fri.	Sat.	Total
John	5	4	8	3	2	10	15	47
Earl	3	2	12	4	1	8	6	36
Jackie	2	4	5	4	7	6	8	36
Debbie	6	8	9	4	7	9	10	53
Christy	15	2	7	4	8	6	2	44
Ned	7	4	2	3	1	2	3	22
Mary	4	5	1	7	5	4	5	31
Total								269

There are 52 weeks in a year, so they multiplied 269 by 52 to find out approximately how many cans and bottles their seven families produced in a year. Figure it out. What is your answer?

Total number of cans and bottles thrown away by your group/week	x	Number of weeks in a year	=	Number of cans and bottles thrown away by your group in a year

That's an awful lot of cans and bottles. Remember, they will not burn, they will not rot, they will not be re-used.

Get some of your friends together and try this study. Do you get similar results?

Christy, Ned, Mary and their friends tried to figure out how many cans and bottles were thrown away in their community. First they found the average amount of cans and bottles thrown away by their seven families.

Total thrown away by their group of families in a year	÷	Number of families	=	Average number thrown away per family in one year

Then they counted the number of families in the community.

	x		=	
Average number of cans and bottles thrown away by one family in a year		Number of families in your community		Number of cans and bottles thrown away by the families in your community in a year

Just How Much Is That?

Ned, Mary and Christy weren't satisfied with just the number of cans.

Mary asked, "If we set the cans and bottles in a long line, how long would it be?"

To find this out they:

1. Marked off a distance of 10 feet on the floor in the basement. They used masking tape to make the line.
2. They brought cans and bottles from their homes and set them along the line. They tried to get a good assortment of sizes, and cleaned them before bringing them to Christy's.
3. How many cans and bottles do you think they found fit side by side along the 10 foot line? Try it and find out.

$$\frac{\qquad\qquad}{\text{Number of bottles and cans}} = 10 \text{ feet.}$$

4. Now they divided the number of bottles and cans in 10 feet into the total number of bottles and cans thrown away by the group in a year.

Number of bottles and cans thrown away in a year	÷	Number of bottles and cans in 10 ft.	=	Number of 10 ft. sections

5. To find the length of the line if all the cans were set end to end, they multiplied 10 times the number of 10 foot sections.

10 x	Number of 10 ft. sections	=	Length of the line of cans	feet

6. To find the length of the line in miles, they divided 5,280 (the number of feet in a mile) into the length of the line of cans in feet.

Length of the line of cans in feet	÷	5,280 feet in a mile	=	Length of the line in miles

10

What Did the Results Indicate?

"What does the garbage collector do with all those bottles and cans?" asked Christy.

To answer this question Jackie called the Department of Sanitary Engineering at City Hall. What do you think Jackie found out? What happens to the tin cans in your city?

"I think all glass bottles should be re-used by the canning companies."

"But it's not just cans and bottles. Dad said plastics are as bad as metal containers, and there are lots of plastic jugs and containers in the grocery store. Besides when some plastics are burned they give off a dangerous gas", said Debbie.

What Did They Do About It?

They asked their parents to buy only returnable pop bottles.

They wrote letters to the editor of newspapers encouraging people to buy only returnable pop bottles.

They reported their results to classes at school. They asked them to talk to their parents.

They got their class at school to conduct the same study.

They organized a neighborhood campaign that urged everyone in their community to buy returnable bottles, and if they had a choice, cardboard containers rather than plastics, metal or glass.

They came up with a possible solution of their own. Why not make small "tapper kegs" that hold two or three quarts of soft drink? These could be paid for once and exchanged each time it was emptied. They put this idea on a petition, got 150 signatures, and mailed it to a major soft drink company.

But the biggest thing they did was the can drive. A scrap metal company offered to pay 10¢ a pound for aluminum cans. They found most pop cans, beer cans, and sardine cans were aluminum. The same company paid $10 a ton for tin cans. It took a lot of organization, and a lot of work. They didn't make any money either, after renting the trailer. They had fun though. They put a ton of metal back into use. They saved their environment from another ton of "hard to get rid of" metal. And they impressed a lot of people with the importance of buying only returnable or destructable containers.

WASHINGTON
SCHOOL
TRASH
OATS

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DIRTY AIR

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D I R T Y A I R

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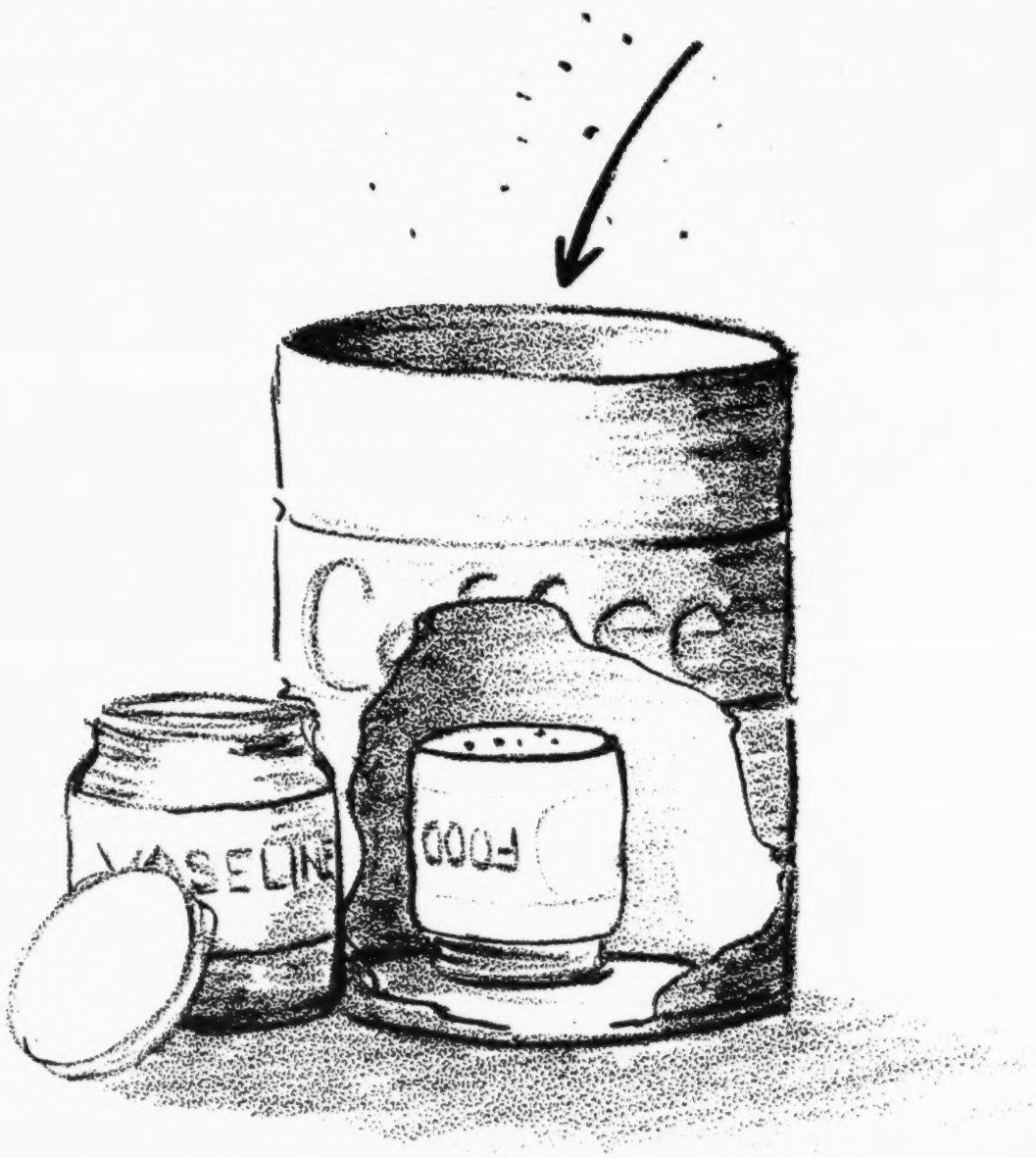
to promote an understanding of the environmental crisis and to form a basis for effective and constructive action by individuals.

Kevin was returning from a visit to his uncle's farm. It had been a great weekend of horseback riding, exploring the farm, and helping his uncle with the farm chores. They returned to the city on an express freeway; racing over the distance

in a matter of minutes. It was a crisp fall day and hint of winter came whistling through the slightly opened window. When they were still many miles from home, Kevin noticed something unusual on the horizon in the direction of the city. It was a low-lying grayish cloud. Looking at the sky in all directions around him he saw nothing very similar to the darkish cloud in the distance. His thoughts roamed back to his classroom and some questions the teacher had raised concerning air pollution. She wanted their opinion on whether their city had polluted air or not. A picture of a T.V. news report on Los Angeles smog entered his mind at the same time. At the time these two events occurred he hadn't given them much thought. Now, however, he felt rather disturbed and the ominous cloud in the distance didn't help his mood.

He talked with his parents and by the time they got home they had helped him form a plan to find out if they had air pollution in their community. He would use vaseline, baby food jars, and soup cans to build pollution collectors. They


VASELINE
FOOD

decided that a heavily vaseline coated small jar inverted inside an open coffee can would collect particles from the air. The coffee can would protect the jar from ground dirt.

Kevin was aware that he must conduct his investigation in an organized and thorough manner, so he decided to follow this procedure:

1. Study only the five blocks in his immediate neighborhood.
2. Prepare five pollution collectors for each block.
3. Locate his air pollution collectors "randomly" around the block in five different spots. (Randomly means he didn't look for spots to put them but decided on a plan for placing all pollution collectors before he left home.)
4. Leave the collectors out for one week.
5. Prepare and complete data sheets for each block. The data sheets would contain a map of the block showing:

(a) location of pollution collectors,

(b) location of things discharging materials into the air.

First he collected 25 baby food jars and then 25 soup cans from around the neighborhood. Then he bought a large jar of vaseline. Using a ruler and pencil he prepared five data sheets, one for each block.

6

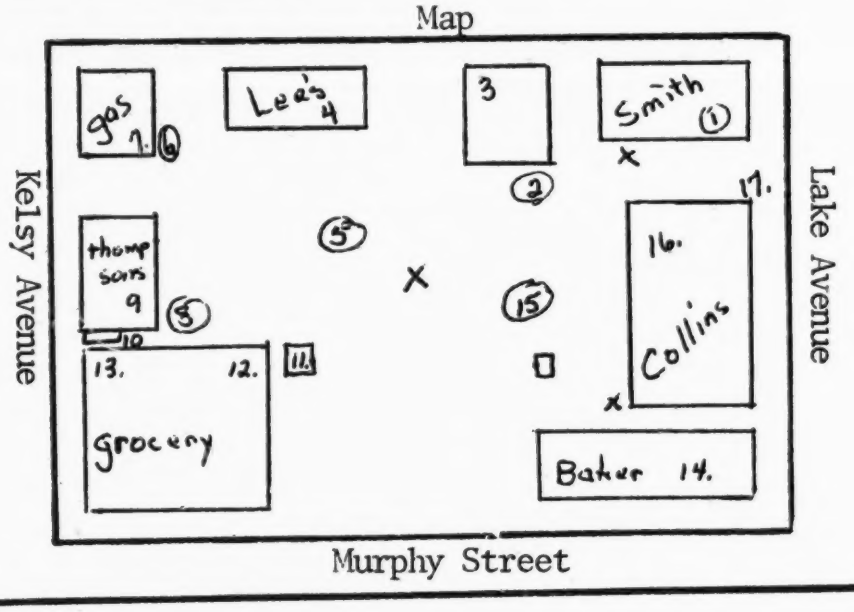
DATA SHEET

Map showing:
(1) Location of pollution collectors (by x)
(2) Location of things discharging materials into the air (by number)

Key to things that are discharging materials into the air.

Number	Description
2.5.15	open burning trash barrels
1.3.4.7.9	chimneys
12.13.14.16	"
6.8.11	incinerators
10	lawn mower
17	car idling

Map



Kevin made the map on the data sheet (not too accurately) by first walking around the block and drawing all buildings on the map.

He carried a bag of material for building pollution collectors with him. When he found a good spot he put one together and recorded its location with an x on the map. In this way he scattered five pollution collectors randomly around each block. You can see the locations Kevin chose for one set of five pollution collectors on the map on page 6.

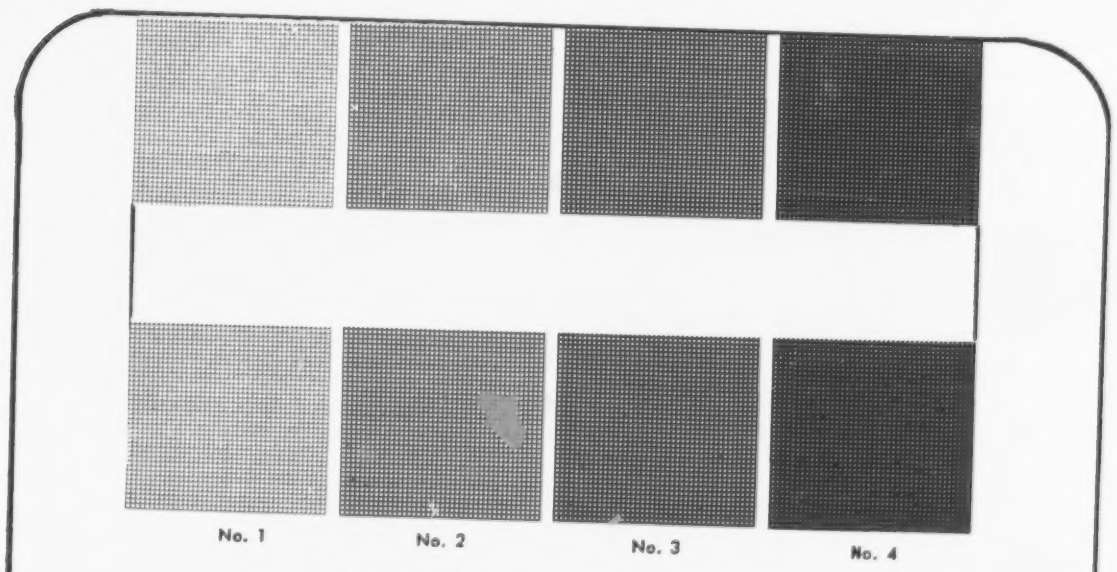
After placing and mapping the pollution collectors, he went back and mapped everything he found that was putting something into the air. Some of the things he put on his map were (1) burning trash barrels, (2) smoke stacks and chimneys, (3) incinerators, (4) outdoor barbecues, (5) running cars, (6) lawn mowers, and (7) stove fans that opened outdoors. He drew the location of each on the map. When he finished he had five maps, one for each block.

When one week had passed, he collected all the vaseline coated jars, keeping the jars for each block separate. At home he grouped the jars from each block and placed each map next to its group of jars.

The results were surprising. Kevin had expected the jars to look dusty, but they were actually a dirty gray! Some particles clinging to the jars were quite large and flake like.

One set of jars stood out from the rest as they were much more darkly coated with particles from the air. This seemed strange to Kevin. He looked at the data sheet and compared it with the sheets from the remaining four blocks. He wondered why the air in this block was so much dirtier than the other four blocks. When he examined the map for that block closely, he discovered the block contained several more open burning trash barrels than the other blocks. It also contained two gas stations and a drive-in restaurant. One of the streets bordering this particular block was a main thoroughfare and heavily traveled. The cars from this street might be adding to the dirty air, he thought.

Kevin wasn't satisfied that these differences (the trash barrels, gas stations, drive-in, and street) would account for all the heavy coating of particles. He showed his teacher, Mr. Peterson, the results of his study. Mr. Peterson suggested that he investigate the incinerators to see how well they burned the garbage. Mr. Peterson suggested that some incinerators don't burn as well as others and so give off more particles. He also pointed out the stacks. "These," he said, "might also be giving off different quantities of particles. To help find this out, Mr. Peterson gave Kevin the Ringelmann smoke Chart shown below.


No. 1
No. 2
No. 3
No. 4
Power's MICRORINGELMANN
These grids are a direct facsimile reduction of the standard Ringelmann Chart as issued by the United States Bureau of Mines. Copyright 1954 by McGraw-Hill Publishing Company, Inc. (Publisher of Power) 330 W 42nd St. New York 36, N Y
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10

To use the smoke chart, Kevin held the chart up at arm's length and looked through the slot in the middle of the chart. He compared the density of smoke coming from the incinerator or chimney with the darkness of the squares on the chart. He always kept the sun behind him so the lighting would be similar for all tests. He checked the smoke at the point where it left the stack.

Mr. Peterson told Kevin that State law insisted no smoke be darker than #3 on the chart. Kevin found one incinerator and four chimneys that were discharging smoke as dark as #4. All these were in the block which, judging from his pollution collectors, had the dirtiest air.

Kevin realized that there is a difference in incinerators and furnaces. Some discharge greater amounts of particles than others.

Just How Much Stuff Is Going Up in Smoke?

Kevin spoke to an engineer from his city's air quality committee. He found out the following information.

If you burn a thousand pounds of paper in an incinerator that produces smoke of the #1 density on the Ringelmann Smoke Chart, you produce on pound of soot. The engineer gave him amounts for each of the densities on the Ringelmann Chart.

Ringelmann Chart No.	No. of lbs. of soot/1000 lbs. paper
#1	1 lb.
#2	2 lbs.
#3	4 lbs.
#4	6 lbs.

Kevin wondered how long it took for his family to burn a thousand pounds of paper. To do this he carefully kept track of all his family's paper waste. His mother helped by putting all paper wastes in one bag and all metal and glass wastes in another. He weighed each bag of paper waste on the bathroom

scales before disposing of it. To do this he made the following calculations: (Kevin's weight with bag of waste) subtract (Kevin's weight) = weight of wastes.

This information he kept on a chart.

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Total
Weight of bag of trash	2	1	1	3	2	1	2	
	4	1	2			3		
						4		
Total # pounds	6	2	3	3	2	8	2	26 lbs.

If this were a typical week, it meant that Kevin's family produced 104 lbs. of paper waste in one month.

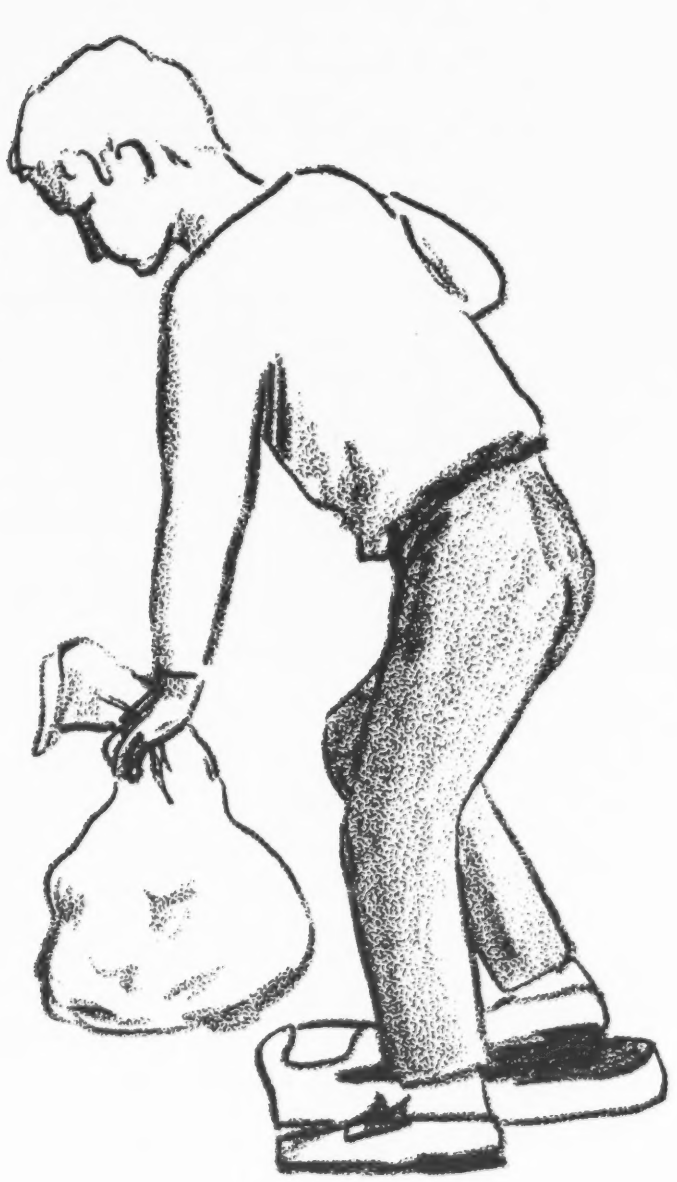
$$\frac{4}{\text{\# of wks. in a mo.}} \times \frac{26 \text{ lbs.}}{\text{\# lbs. produced in one week}} = \frac{104 \text{ lbs.}}{\text{\# lbs. produced in one month}}$$

He figured out how many months it would take to produce one thousand pounds of waste paper.

weight of both
Kevin and trash .....

subtract
weight of Kevin .....

equals
weight of trash .....



It was 9 months.

$$1000 \text{ lbs.} \div \frac{(104 \text{ lbs.})}{\text{No. of lbs. produced in one month}} = \frac{9 \text{ months}}{\text{No. of months needed to produce 1000 lbs. waste paper}}$$

To satisfy his curiosity, Kevin imagined he was burning that thousand pounds in the trash burners he found in the block which produced the sootiest, darkest vaseline jars.

Using the Ringelmann Scale he went over the block again and recorded the Ringelmann numbers for each trash barrel and incinerator that he didn't already have numbers for. He then filled in the following chart:

Chart For Block With Dirtiest Air

Type of Burner	Register # on Ringelmann Scale	# lbs. soot produced in nine months
Open Barrel	#4	6 lbs.
" "	#4	6 lbs.
" "	#4	6 lbs.
" "	#4	6 lbs.
Incinerator	#1	1 lb.
"	#4	6 lbs.
"	#3	4 lbs.
"	#2	2 lbs.
		Total 35 lbs.

About thirty-five pounds of junk was being discharged into the air in nine months. That's more than Kevin's little sister weighs! Kevin wondered how much more was added by furnaces, motors and the other things he had found during his survey.

What Did Kevin Do About His Findings?

(1) He carefully recorded all his findings on a piece of ditto paper his teacher gave him. He did not put down the names of any of his neighbors. His teacher used the ditto paper to run off a hundred copies. Kevin distributed these to his neighbors in all five of the blocks he had studied. Kevin is not sure how much good this did. However, one week later Mr. Harrison bought a good incinerator to replace his open trash barrel.

(2) He wrote a letter to the editor of the local newspaper, telling about his study and the results.

(3) His teacher asked him to report on his study to the class. As a result, the class wanted to try the same study. So all thirty of Kevin's classmates repeated the investigations on their home block.

(4) Kevin wrote a letter to the chairman of his City Council, telling of the study and urging the city to enforce laws controlling the burning of trash.

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Trash Is Taking Over

Sounds and Silence

Pesticides Are Perilous

Tragedy in the Laundromat

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"GIVE EARTH A CHANCE"

A series of booklets produced by the

Environmental Science Center
5400 Glenwood Avenue
Golden Valley, Minnesota 55422

to promote an understanding of the environmental crisis and to form a basis for effective and constructive action by individuals.

Listen

Do you hear it?

The silence

Dwell on it

For its extinction is near.

After this strange poem my radio stopped broadcasting and was silent for five whole minutes. Was that ever weird! There I sat, in my cave under the covers, listening to -- nothing. My cave is my secret place. I can crawl under the blanket in my bed and hide from everything. Sometimes, after Mom and Tom and Joe and Margaret and Lizzie have gone to sleep I sit in my cave and play games or read or listen to my little radio.

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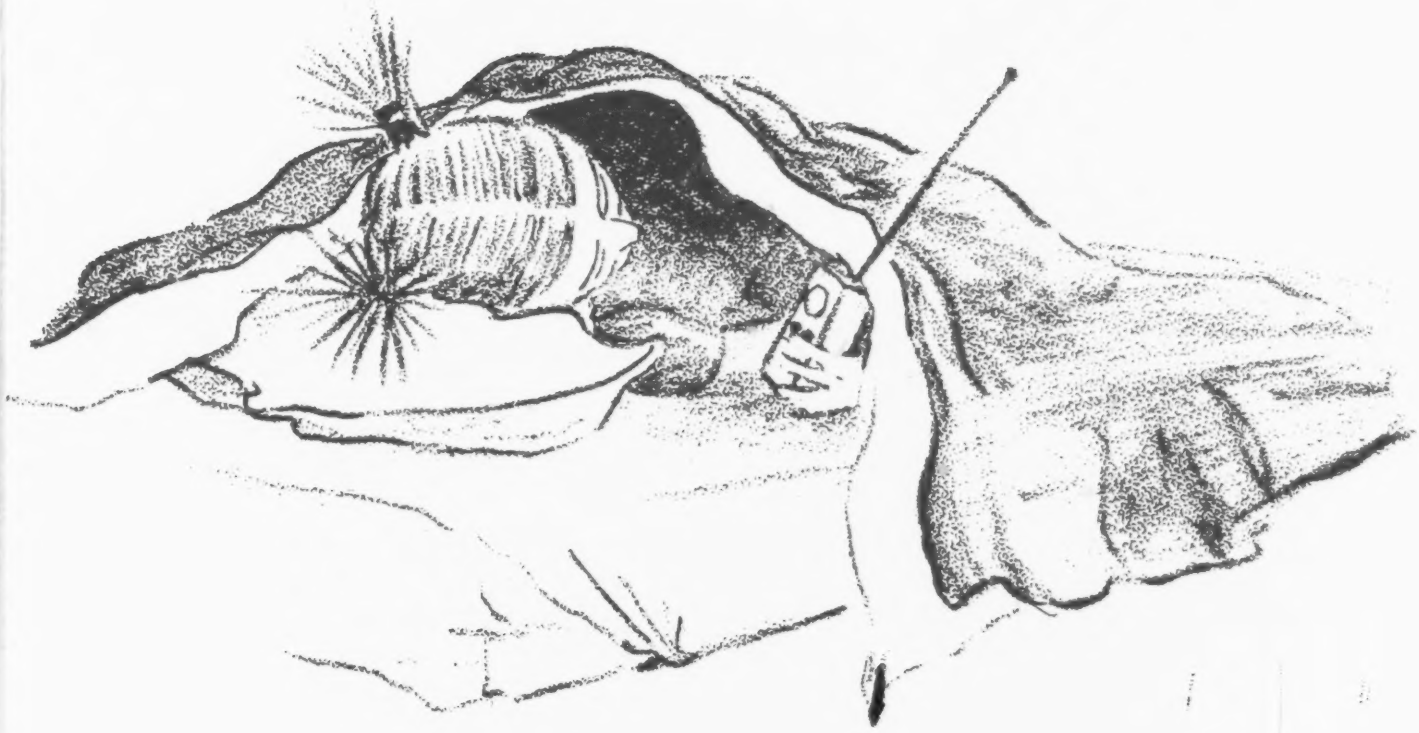


I listened, but it wasn't silent. I could still hear the radio buzzing. The springs squeaked when Lizzie wiggled on the top bunk, a truck roared by outside, and a faucet was dripping. I started thinking about silence; had I ever heard it? Of course! But when?

I decided to search for silence. Where could I find it and when?

At first, I just listened during the day. Some times were quieter than others, but I live in the city and could always hear sounds no matter where I went. I asked Mom how I could measure sounds and find out more about them. She told me to ask at school, so I did.

I asked Mr. Benson, my teacher, where I could find silence and how I could study the sounds that are making it disappear. Was I surprised! Mr. Benson was so interested in my idea that he decided to let my whole class study sounds and silence. He let us go outside, use tape recorders, and play games.

We really had fun doing the study. We found: different kinds of sounds at different times of the day, certain times when it was quiet and other times when it was noisy, sounds caused by people and their machines and sounds caused by nature, places that were noisy and places that were quiet, and best of all -- A SILENT PLACE.

The things we did are written in this booklet. I hope you study sounds and silence too.

Yours truly,

Sandy

A Guessing Game

Using a portable tape recorder, record several sounds you hear around your home or school. Number each sound as you record it, by talking into the microphone, and write down what it is and where you recorded it in a notebook. You may want to take a friend along to help you.

Play the recording for your friends and let them guess what the sounds are, and where you recorded them.

This game is the most fun when several different teams make recordings.

Also try taking a walk with the tape recorder, recording as you walk. Then let your friends guess your route by listening to the sounds you recorded.

People Sounds Versus Sounds in Nature

Expand your game. Make a tape of sounds made by people and their machines and another of sounds which occur in nature. To record some of the sounds in nature you may want to go out of the city.

Some of the sounds you might record are listed below. However, you will hear many different sounds around you and do not need to follow this list.

PEOPLE SOUNDS	SOUNDS IN NATURE
Horns honking	Rain falling
Rock music	Thunder
Jackhammers	Crickets chirping
Trucks going by	Birds singing
Brakes squeaking	Squirrels scolding
Bells ringing	Flied buzzing
Typewriters typing	Brooks running
People talking	Dogs barking
Children playing	Wind blowing
Sirens	Cats meowing
Singing	Fire crackling
Airplanes flying over	Cows mooing

Which sounds are loudest?

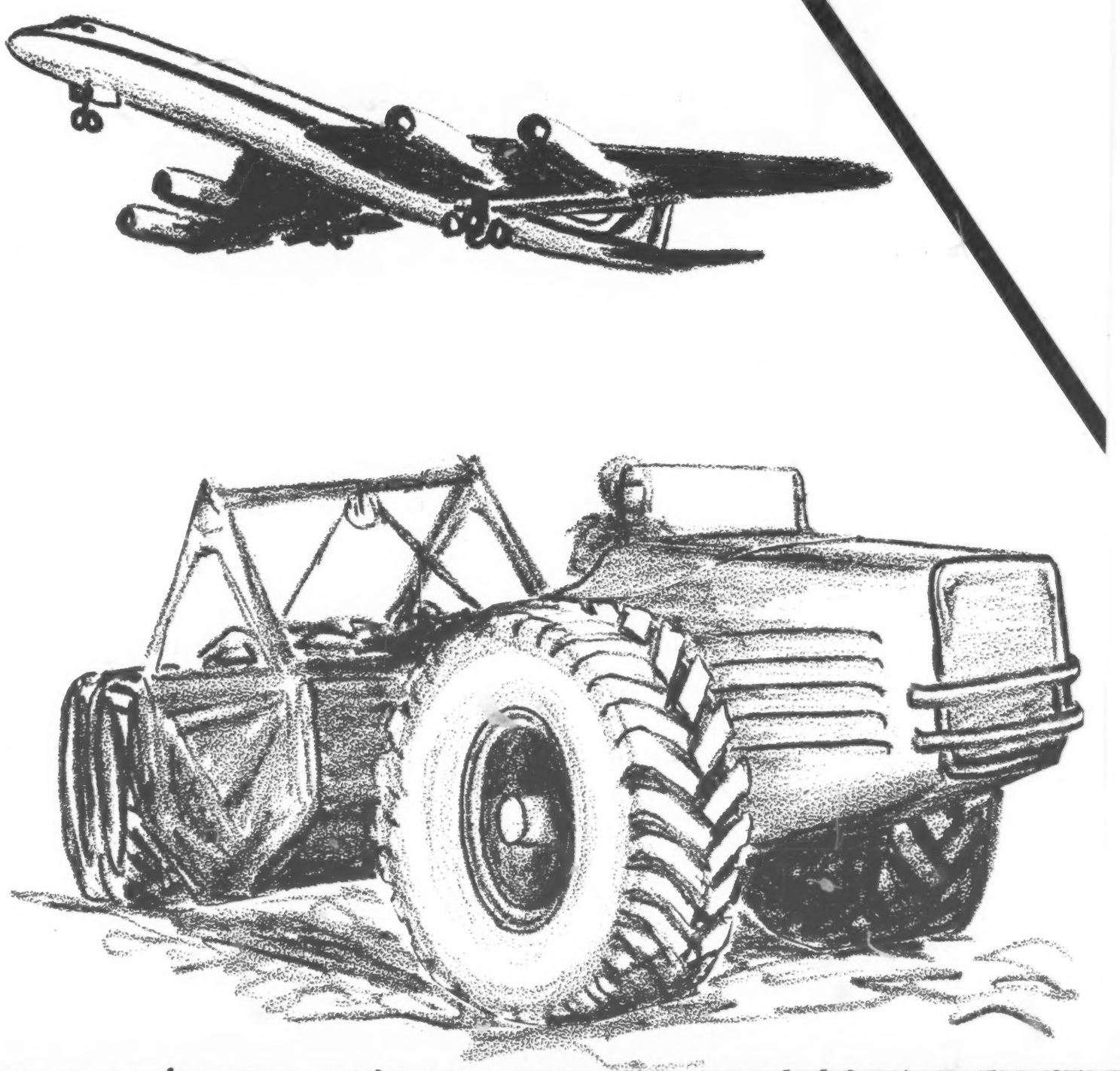
Which sounds do you like the m

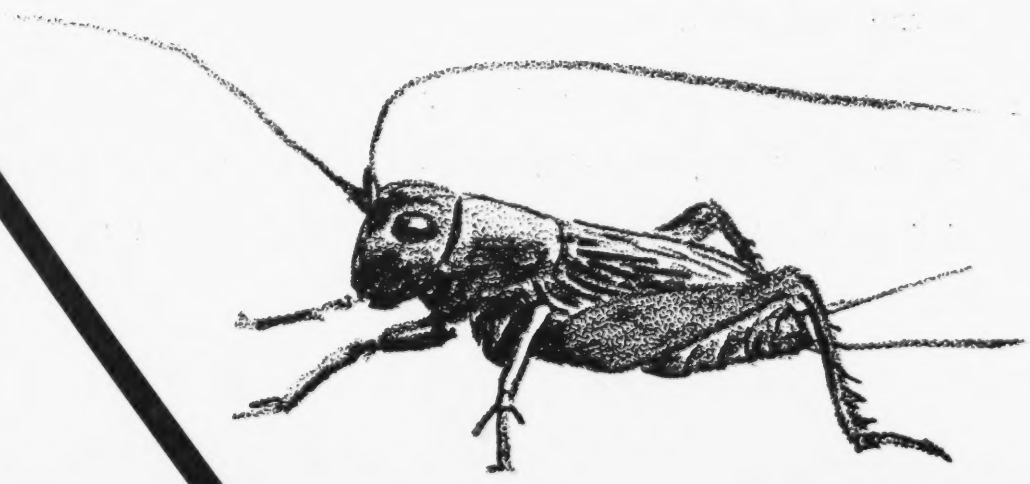
Which sounds do you dislike:

called noises.)

Were the sounds you disliked mostly people sounds or sounds in nature?

Why did you dislike them?





A Sound Line Through Time

Can you make a line through time?

Try it using the tape recorder.

First, choose one place to make your time line. You could choose a busy street corner, a park, a yard, or a spot on the school grounds. Mark the place where you will make the recordings, so you can return to the exact spot.

You will want to make a schedule for your time line. Try to cover as many hours of the day as possible, recording the same five or ten minutes during each hour. Before you start each recording period say the date, location, and time into the recorder. You may want to take turns with your friends to make the recordings, but be sure everyone records at the same location.

While you are recording, you may want to write down the sounds you hear, to refer to later. If you draw a chart similar to the one shown here your results will be easy to follow.

Location: Southwest corner of Bradley Avenue and Fifth St.			
Date	Time	Sounds I Hear	
		Near Me	Far Away
June 1	7:00-7:05 am	Cars - Birds	Jackhammer
June 1	8:00-8:05 am	Cars - Trucks-Buses	Airplane
June 1	9:00-9:05 am	Bulldozer - car Children play-ing	

This list can be continued for all of your observations.

When you have finished making the recording, listen to it with your friends. Set the volume of the tape recorder at one place and leave it at that position while you listen so you can compare the loudness of the sounds. You will want to look at your chart while you listen to the recording.

What times during the day are the noisiest?

What things are making the most noise?

What times during the day are the quietest?

What sounds do you hear even when it is rather quiet?

What reasons can you think of for the quiet times and noisy times? What are people doing during those times?

Do you think your results would be similar on another day?

Would they be similar on <u>every</u> day?

When do you think the results would be different?

When would it be most quiet?

Try recording on different days to see if your answers above are right or wrong.

A Sound Line Through Space

Plan a trip to record a sound line through space. Draw your line on a map of your community, starting in the center and ending as far away as possible. Mark five recording stations on your line, making sure they are the same distance apart. The distance may be as short as 1/2 mile or as long as 5 or 10 miles.

You may want to take a camera along when you make your trip and take pictures at each station, writing down which pictures you take. Also make a chart to write down your observations at each station. It could look like this one we made.

Station number: 1

Location: Northeast corner of Main and First Street

Type of area: Downtown

Date: June 3

Time: 9:15 - 9:20 a.m.

Sounds I Hear		Pictures taken
Near Me	Far Away	(Or description of what you see)
Cars People talking Buses Construction machinery	Cars Horns Train	1. Southwest corner bank building 2. Southeast corner - Movie theatre. 3. Northwest corner - drugstore 4. Northeast corner - parking structure.

Now you can follow your line through space. You must use the map to find the locations of your stations. Plan to record for five minutes at each station. You can travel by car, or perhaps go by bus like our class at school did. (But be sure everyone is quiet while the recordings are made.)

When you get back you may want to plan a special showing of your pictures and recordings. If you took slides you could show them to a large group while you play the recording. Pictures printed on paper may be displayed on poster board with a description of the sounds you recorded. Mount your map too, so people can see where you took the pictures and made the recordings.

Before you display or show your results, you must study them. Listen to the recording, look at the pictures, and see what they tell you.

Which place was noisiest?

Which place was quietest?

Were more people present in the noisy or quiet places?

Rate the recordings at each station: the loudest could be 1, the quietest 5. Write these numbers beside each station on your map.

How does the loudness of the sound compare with the distance from the center of your city or town?

What things caused the most noise?

What things did you see in quiet areas?

What things did you see in noisy areas?

Do you think noise is a kind of pollution?

What kinds of noises are pollution noises?

You will want to discuss the answers to these questions when you present and display your results.